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INTRODUCTION.

This REVIEW is based on reports for March, 1891, from 2,406 regular and voluntary observers. These reports are classified as follows: 171 reports from Signal Service stations; 118 reports from United States Army post surgeons; 1,567 monthly reports from state weather service and voluntary observers; 32 reports from Canadian stations; 183 reports through the Central Pacific Railway Company; 335 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine reports through the "New York Herald Weather Service;" monthly reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa Weather and Crop Service, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, North and South Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, and Wisconsin, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

CHARACTERISTICS OF THE WEATHER FOR MARCH, 1891.

The month was the coldest March on record from the lower Missouri valley to central Texas and thence westward to the Rocky Mountains, where the mean temperature was 5° to 8° below the average. The mean temperature was generally below the March average, except over the extreme northeast and southeast parts of the country and on the middle and south Pacific coasts, where the departures above the average temperature were small. The highest temperature reported by a regular station of the Signal Service was 94°, at Rio Grande City, Tex., and by a voluntary observer, 97°, at Fort Ringgold, Tex. The lowest temperature reported by a regular station of the Signal Service was —34°, at Fort Assiniboine, Mont., and by a voluntary observer, —44°, at Rhinelander, Wis. At stations in the Dakotas and north Nebraska the minimum temperature was 2° to 8° lower than previously reported for March. On the 14th and 15th frost was reported generally in the east Gulf states and north Florida, and tender vegetation was reported injured in North Carolina and north Mississippi.

The monthly precipitation was the heaviest ever reported for March at stations in the south part of the middle Atlantic states, in the Carolinas, Tennessee, Upper Michigan, northeast Minnesota, Kansas, Nebraska, east Colorado, north Utah, and west Montana. The precipitation was in excess of the March average, except over the northwest, southwest, and extreme northeast parts of the country, and at Lake Erie stations. On the northeast and middle-eastern slopes of the Rocky Mountains and over the middle plateau region more than double the usual amount of precipitation was reported, and at Key West, Fla., in the extreme northwest, the middle Atlantic states, the Ohio Valley and Tennessee, on the southeast slope of the Rocky Mountains, in the Missouri Valley, the upper lake region, and in the south Atlantic and east Gulf states the monthly precipitation was one-fourth to three-fourths greater than usual. On the south Pacific coast about one-fourth, and on the middle Pacific coast and over the southern and northern plateau regions one-half to three-fourths of the average precipitation for March was reported. Along the middle Atlantic coast and in the south Atlantic and east Gulf states farming operations were retarded by wet weather. The monthly snowfall exceeded 60 inches at Cumbres, Colo.; 50 inches at Blue Knob, Pa., and Summit, Cal.; and 40 inches at Alton, Kans., and Marquette, Mich. At the close of the month a depth of more than 100 inches was reported on the ground at Cumbres, Colo., more than 20 inches at mountain stations in south-central Pennsylvania, northeast West Virginia, Colorado, and northeast lower Idaho, and in upper Michigan.

Destructive local storms were reported at Wheatland, Cal., on the 5th, in western Mississippi, western Tennessee, Louisiana, and South Carolina on the 7th, in Alabama and South Carolina on the 8th, at Hess Road Station, N. Y., on the 13th, in Pike Co., Ga., on the 26th, at Key West, Fla., on the 27th, at Galena, Ill., and in Dickinson Co., Kans., on the 29th, and in Claiborne Co., La., on the 30th. Severe thunder-storms occurred in southeast Massachusetts on the 1st, in Mississippi and Georgia on the 8th, along the Hudson River, N. Y., on the 9th, in Florida and South Carolina on the 21st, on the North Carolina and New Jersey coasts on the 22d, and at Indianapolis, Ind., on the 30th. Destructive general storms occurred in Puget Sound on the 8th; over Long Island Sound and over Lake Ontario on the 13th, when the U. S. S. "Galena" and the tug "Nina" went ashore at Gay Head, Martha's Vineyard; in South Carolina on the 17th. A "norther" prevailed in California and Nevada on the 17–18th. A severe storm prevailed on the New Jersey coast on the 20th; on the North Carolina coast on the 24th, when a vessel was wrecked at Chicamicomico and nineteen persons drowned; on the Virginia coast on the 26th; on the North Carolina and Virginia coasts, over Chesapeake Bay, and on the New Jersey coast on the 27th, when a steamship went ashore near Cape Henry and seven persons were drowned.

The first boat of the season arrived at Albany, N. Y., from New York City on the 25th. The Morris Canal, New Jersey, was open to navigation on the 30th. The first trip of the season between Detroit, Mich., and Cleveland, Ohio, was made by a steamer on the 12th. On the Mississippi River navigation opened at Davenport, Iowa, on the 25th, and the river was clear of ice at Saint Paul, Minn., on the 30th. On the Missouri River navigation opened at Sioux City, Iowa, on the 31st. On the 25th navigation on the Saint Clair River was entirely closed by ice, and on the 30th navigation was resumed. On the 31st lower Lake Huron was covered with floating ice and there

was no indication of a resumption of navigation. On the 29th the first boats of the season arrived at Manistee, Mich., and the channel at Green Bay, Wis., was free from ice.

The lower Mississippi River continued high during the month, and several crevasses were reported in the levees in Mississippi and Louisiana; no serious damage was caused. The middle Ohio river was above the danger-line at the opening of the month, but subsided rapidly. Damaging floods occurred along the Cumberland and Tennessee rivers in Tennessee and along the Savannah River in Georgia, and high water caused damage along the Little Colorado River in Arizona, and along the Sacramento River in California. At Yuma, Ariz., the rivers fell rapidly and railroad communication to the west was resumed on the 4th.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for March, 1891, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on Chart II by isobars. The departure of the mean pressure for March, 1891, obtained from observations taken twice daily at the hours named, from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Duluth, Minn	+.001	Saint Louis, Mo	—.002
Atlanta, Ga	+.002	Memphis, Tenn	—.002
Cleveland, Ohio	+.003	Omaha, Nebr	—.002
Albany, N. Y	+.004	Bismarck, N. Dak	—.002
Pittsburgh, Pa	+.005	Saint Paul, Minn	—.004
New York City	+.007	Moorhead, Minn	—.004
Key West, Fla	+.007	Denver, Colo	—.005
Eastport, Me	+.009	Salt Lake City, Utah	—.006
Jacksonville, Fla	+.009	Abilene, Tex	—.009
Washington City	+.010	Santa Fé, N. Mex	—.010
Lynchburgh, Va	+.011	San Francisco, Cal	—.015
Wilmington, N. C	+.014	El Paso, Tex	—.016
Boston, Mass	+.016	Fort Assinniboine, Mont	—.017
Chicago, Ill	.000	Yuma, Ariz	—.022

The mean pressure was highest over the middle Missouri and Red River of the North valleys, over the east part of the Lake region, in the middle Atlantic and New England states, and from the Pacific coast between the 40th and 45th parallels northeastward over the valley of the Columbia River, where it was above 30.10. East of the Rocky Mountains the mean pressure decreased southward to the Gulf coast, where it was below 30.05, while to the west of the Rocky Mountains the mean pressure decreased from the valley of the Columbia River and west Oregon southward to less than 29.95 over the southern plateau, and northward to less than 30.00 in the British Possessions north of the northern plateau.

A comparison of the pressure chart for March, 1891, with that of the preceding month shows that there was a general increase in mean pressure north of the 40th parallel, save on the northeast slope of the Rocky Mountains, and on the Pacific coast there was an increase in pressure as far south as the 35th parallel. The greatest increase in mean pressure occurred on the north Pacific coast, where it exceeded .20, and the increase exceeded .10 over the north part of the Lake region and thence east over the Saint Lawrence Valley. The most marked decrease in mean pressure occurred along the south Atlantic and east Florida coasts, and at Fort Du Chesne, Utah, where it was more than .10, and the decrease was more than .05 over the east Gulf states, over a great part of the southern plateau, and at stations in the British Possessions north of Montana. In the preceding month the mean pressure was highest along the south Atlantic coast, and lowest on the north Pacific coast, while for the current month it was highest in areas over the northern part of the country from the Atlantic to the Pacific coasts, and lowest over the southern plateau.

The mean pressure was above the normal east of a line traced from the Dakotas to South Carolina, over the northern plateau, and along the Pacific coast north of the 40th parallel; elsewhere it was below the normal. The greatest departure above the normal pressure occurred over the Canadian Maritime Provinces, where it exceeded .20, and on the north Pacific coast it exceeded .05. The most marked departure below the normal pressure occurred over the southern part of the country from Florida to south California, where it was more than .05.

The monthly barometric range at each station of the Signal Service is given in the table of Signal Service data.

HIGH AREAS AND STORMS.

The general weather conditions of this month have shown two remarkable characteristics, a lowering of temperature below the normal over the whole country, except in northern New England, where it was nearly stationary, and an increase of precipitation, above the normal, over the whole country, except in a few isolated spots. No March in 19 years has shown such departures from the normal. In 1876 there was a similar excess of precipitation, and an examination of the charts shows a marked coincidence in weather conditions for these two months. In 1885 there was also a marked diminution in temperature for nearly the whole country, but the progress of high areas and storms was different from that in this month. We may regard the conditions in 1876 and 1891 as typical, and hence it is of great importance to determine the causes of these anomalies. It should be noted that there has been no change in seasons or in the average conditions of temperature, precipitation, and pressure. The most marked peculiarity in this type, if it may be so regarded, was a tendency for high areas to either remain nearly stationary in the Lake region or to move in paths far to the north. As a consequence the storms made a sweep far to the south, circling this condition of high pressure. The cold north winds blowing into these storms lowered the temperature and at the same time produced the conditions favorable to increased precipitation. It should be noted that both high areas and storms presented very few marked contrasts, and consequently these peculiar characteristics were due to general and not special conditions.

At the close of this description will be found a table giving some of the more important facts relating to high areas and storms, and on Chart I are given storm tracks for this month.

AREAS OF HIGH PRESSURE.

During the month of March there have been 10 high areas whose paths were well enough defined to be traced. Their average duration was 4.9 days and the mean velocity 28.1 miles per hour, while during this month the storms have had a duration of 4.3 days and a velocity of 27.6 miles per hour. Of these high areas VIII started in Texas and IX on the middle Pacific coast. The other eight first appeared to the north of Montana. No. IV disappeared in Texas, IX in Ohio, X in the Saint Lawrence Valley, and the other seven reached the Atlantic coast.

I.—This was a continuation of VI of February. It was central over Lake Erie on the 1st and moved northeast, passing into the Gulf of Saint Lawrence on the 4th. A pressure of 30.78 and temperature of —42° were reported from White River, Ont., but only a few stations in the extreme north reported temperature below zero during its passage.

II.—On the first day of the month this high area had just appeared at Edmonton, N. W. T., where the pressure was 30.68 and temperature —18°. Its track was a very little south of east to Lake Huron and then east-northeast to the Atlantic off Nova Scotia. The lowest temperatures ever observed during the first ten days of March were reported during its progress on the 2d and 3d in Montana, Dakota, and northern Nebraska. At Fort Assinniboine, Mont., —32°, or 6° below the lowest; Bismarck, N. Dak., —32°, or 12° below; Valentine, Nebr., —26°, or 10°